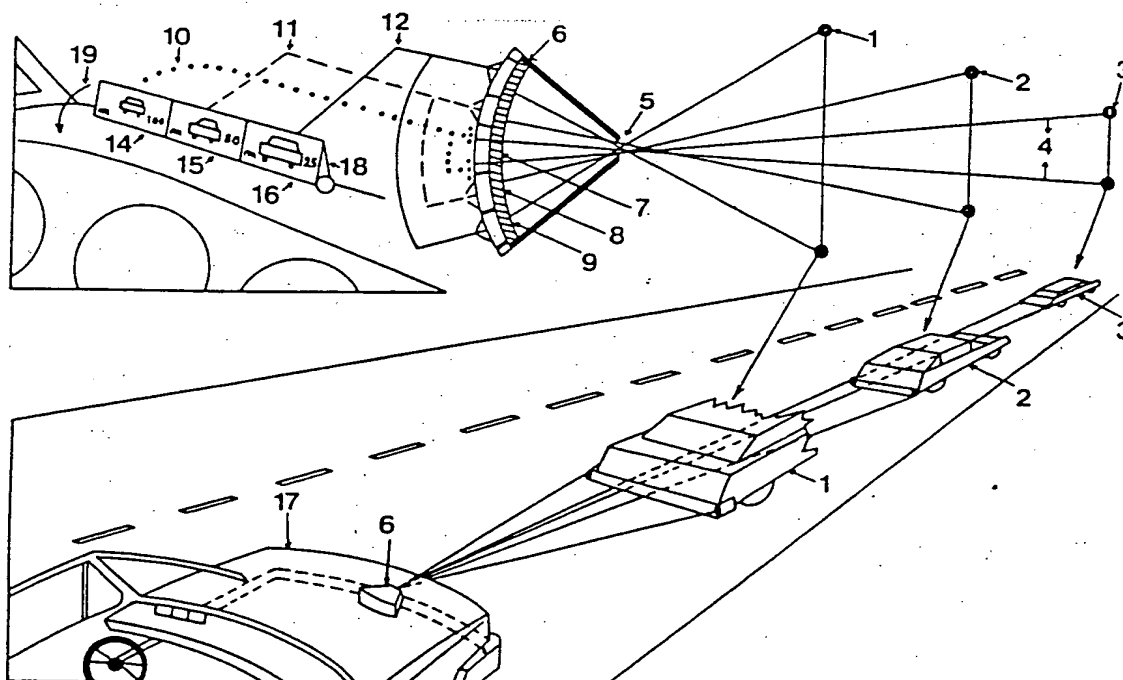


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(21) International Application Number: PCT/IT88/00031 (22) International Filing Date: 4 May 1988 (04.05.88) (71)(72) Applicant and Inventor: MONACO, Eugenio [IT/IT]; Via San Calepodio, 36, I-00152 Roma (IT). (74) Agent: MASCIOLI, Alessandro; A.N.D.I. - Associazione Nazionale degli Inventori, Via Lima, 35, I-00198 Roma (IT). (81) Designated States: AT (European patent), BE (European patent), CH (European patent), DE (European patent), FR (European patent), GB (European patent), IT (Euro- pean patent), JP, LU (European patent), NL (European patent), SE (European patent), US.		Published <i>With international search report.</i>

(54) Title: A DEVICE FOR THE SCREENING IN THE FOG WITH 100 TO 7000 MICRON ELECTROMAGNETIC WAVES AND MICROCELL SCREEN

**(57) Abstract**

The device according to the present invention comprises an emitter with lights (1, 2 and 3), and a microcell screen (6), and allows to detect and visualize in a very strong natural or artificial fog any vehicle or means on land, air or sea, and to give information about the distance thereof to the observer.

"A device for the screening in the fog with 100 to 7000 micron electromagnetic waves and microcell screen"

The present invention concerns a device for the screening
5 in the fog, consisting in an optic-electronic complex with
100 to 7000 micron electromagnetic waves, with a microcell
screen.

It is well known that the radars known until now are not
10 suitable for the application on vehicles and similar, due
to the considerable encumbrance and of the excessive electrical
input and cost.

It is the aim of the present invention to realize a device
15 mounted on vehicles and similar, with a minimum encumbrance,
moderate costs and electrical input, for the detection and screening
in the fog of any other vehicle or similar.

20 The aim set forth is reached by means of a device with electromagnetic
waves, with a wave length interval from 100 to 7000 micron, placed
between the end of the infrared radiations and the beginning of the
microwaves; said waves are picked up by a microcell screen consisting
25 in very small sensitive elements placed like a chess-board, consisting
in known material, suitable for the detecting of the radiations
corresponding to the wave length to the extreme infrared, altered
with elements suited for the detection of the initial microwaves.

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The advantage of the device is evident, as the waves corresponding to the interval chosen and with the provided powers travel without a considerable input even in the most strong fog, up to distances of many hundred meters, allowing the detection of the presence of vehicles or means of any kind.

Furthermore, the device according to the present invention comprises means for the identification of the distance of said vehicles or similar.

The present invention will be described more in detail hereinbelow relating to the attached drawings in which some preferred embodiments are shown.

Figure 1 shows a scheme of a device for the screening in the fog, according to the present invention.

Figure 2 shows a perspective view of the functioning of the device of figure 1.

Figure 3 shows a detail of a monitor for the screening of the vehicles.

Figures 4 and 5 show a scheme of a variant of the device according to the present invention.

Figure 6 shows a block scheme of the device according to the present invention.

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The figures show a device for the screening in the fog, with electromagnetic waves from 100 to 7000 micron and microcell screen, mainly comprising lights 1, 2 and 3 provided in the back part of the vehicles and emitting radiations 4 which
5 change the impact angle on the screen 6 according to the distance of the preceding vehicle from the following one. In the case of the light 3 corresponding to a more distant vehicle, said radiations fall on the objective (divergent lens) of hole 5 of the receiver, placed on a vehicle in arrival and
10 strike the sensitive screen 6, shown with dotted lines, in area 7. In a similar way the beams of the lights 1 and 2 reach areas 8 and 9 of said screen 6.

For what concerns the functioning of the device, when the
15 beams excite the area 7 of the screen 6, they cause the contact with the dotted circuit 10, battery fed and comprising an eventual signal amplification. The same happens for the lights 2 in area 8, with a contact to dotted circuit 11 and for lights 3 in area 9 with a contact to circuit 12, marked
20 with a continuous line.

Therefore, circuit 10 lights alarm 14 with an eventual very slow intermittence that lightens the image of the vehicle printed thereon and signals the distance of about 100 meters
25 of the beams.

Circuit 15 lightens alarm 11 with the image of a vehicle greater than the first one and signals 50 at quick intermit-

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tence. Circuit 12 lightens alams 16 marked by the image of a vehicle at maximim width and marks 20 with continuous sound. Therefore, when the vehicle 17 receives by means of device 6 the beams of a vehicle of any kind preceding the same of 100 meters or more, i.e. vehicle 3, the fact is noticed to the driver by alarm 14.

When the preceding vehicle is at a distance of 50 meters, it is noticed by alarm 15, when it is at a distance of 25 meters by alarm 16. The alarms 14, 15 and 16 are placed in supporting frame 18, of very small dimensions which, e.g., may be 3 cm by 15 cm, placed on the board in front of the driver.

Said frame having a thickness of only 1 cm, may be turned over by the movement of the indicator 19 and it may also be encased in the plane, when it is not used, i.e. in a day without fog. For what concerns the kind of electromagnetic radiations emitted by the lights being of dimensions not superior to the usual reflectors placed above the bumpers or below the indicator block it should be noted that obviously the optimal wave length must be defined during the realization and experimentation of the prototype, but that however the area to be exploited is comprised between the last part of the infrared radiation, i.e. a wave length of 100 micron and more, and the first part of the microwaves, i.e. a wave length from 100 to 7000 micron and more.

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Furthermore, figure 3 shows the monitor 20 of small dimensions that may be extractable from the plane above the board or also be placed elsewhere and which, by means of a single push button, may be inserted to the television antenna on board and therefore used as a usual television.

In detail, it is to be noted that the whole complex may be mounted in various points of the whole front part of the vehicle.

For example: above or below the bumper, between the lights of the vehicle and the radiator, inside the roof, above or aside of the driving mirror, or also covered by the sunshade, below or aside of the windscreen, etc. Said device may be easily electrically and thermically screened, so as not to be subject to various interferences.

For what concerns the functioning of the emitting device, and relating to the block scheme of figure 6, the three lights 1, 2 and 3, mounted on the back part of the vehicle through the stabilizer 21 battery-fed operate the modulator 22 that causes the diode 23, having a transmitting resonating cavity R, to emit said radiation from 100 to 7000 micron, which may be produced also by other known means.

For what concerns the reception of said electromagnetic waves, by means of the device placed in the front part of the vehicle the wave emitted by the lights strikes the receiving 24 cavity R provided with a diode with a low frequency

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signal with an amplitude proportional to the emission distance, as a modulating waves is associated to the carrying one; from the diode the signal passes to the only amplifier 25 or to a plurality of amplifiers, and from
5 these to a band filter 26 for the elimination of the ambient disturbances, from which only the modulating may get out which through the comparator 27 with modulation amplitude at three adjustable levels with variable resistances set for the three distances, reaches the three
10 alarms 14, 15 and 16 that mark the 100, 50 and 20 meters, i.e. the interval existing between the preceding vehicle and the following one.

In the variant according to figures 4, 5 and 6 the divergent lens 5 is replaced by a hole of very few mm and very little specular blades 28 so as to obtain a greater selection, i.e. spreading of the beams coming from emitting lights 1, 2 and 3 and that strike the five sensitive areas 13, diode, insulating cavity R or other means.
20 It shall be underlined that said blades may be inserted also keeping lens 5 in such a way as to obtain a greater spreading of the beams.

In a possible variant, in case of damage of the device or
25 according to the wish of the driver, should the emitting lights placed in the back part of the vehicle, it will be sufficient to light a light placed in the front part of

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the vehicle, emitting electromagnetic waves with a wave length from 100 to 7000 micron, so that the beams thereof reflected on the preceding car may operate the receiving device, corresponding to block 24 of the scheme of figures 4, 5 and 6 and shown in the particular structure thereof 6 in figure 1, with the relating alarms, as well as monitor 20. In this case, the advantage of an absolute independence is obtained in receiving notice of obstacles for each single vehicle.

CLAIMS

1. A device for the screening in the fog, that may be applied on vehicles and means on land, air and sea, characterized in:
 - 5 - an emitter consisting of lights (1, 2, 3), placed in the back part of vehicles and similar, emitting a radiation (4) in the interval of electromagnetic wave lengths between 100 and 7000 micron, between the end of the infrared radiations and the beginning of the microwaves,
 - 10 - a microcell screen (6), applied to the front part of the vehicles, consisting in sensitive elements, suitable for the detection of the radiations corresponding to the wave lengths of the extreme infrared alternated with sensitive elements for the detection of the beginning of the micro-
15 waves;
 - a frame (18) housed inside the vehicles or similar, carrying a plurality of alarms that will light, in succession, for indicating the distance of the detected vehicle.
- 20 2. A device for the screening in the fog, according to claim 1, characterized in that the divergent lens (5) placed on the input hole of radiations (4) of said screen (6) widens the receiving angle of radiations (4) so as to improve the selection thereof in areas (7, 8, 9a) of said screen (6).
25
3. A device for the screening in the fog according to claim 1, characterized in that the radiations (4) emitted by lights (1, 2, 3) strike, while always varying the impact angle on screen (6), areas (7, 8, 9) of screen (6), thus closing the

independent circuits (10, 11, 12) which, in turn, feed the alarms (14, 15, 16) which mark the distances of 100, 50 and 25 meters between the vehicle or similar and the following one, while at the same time said circuit operates for each single alarm an acoustic signal variable from very slow intermittence, corresponding to the distance of 100 meters, to a continuous sound, corresponding to the distance of 25 meters.

- 10 4. A device according to claim 1, characterized in that said lights for the emission of radiations (1, 2, 3) are placed in the back part of vehicles and similar in three preferred points: below the indicators and above the bumper, above the indicators aside the baggage room or at the angles of
15 the roof above the back window.
5. A device according to claim 1, characterized in that said receiving microcell screen (6), connected by circuits (10, 11, 12) to frame (18), may be mounted in various parts of
20 the front part of the vehicle: above or below the bumper, between the lights, above or below the sunshade.
6. A device according to claim 1, characterized in that said frame (18), in which three acoustic sources with intermit-
25 tent, slow and continuous sound are inserted and containing the alarms (14, 15, 16) is of the kind that may be turned over on the board (19), so as to be hidden, when it is not used.

7. A device according to claim 1, characterized in that said lights (1, 2, 3), through stabilizer (21) battery-fed, operate modulator (22) that causes the diode (23) having a resonating transmitting cavity (R), to emit said radiation
5 from 100 to 7000 micron.
8. A device according to claim 1, characterized in that the electromagnetic wave emitted by said lights (1, 2, 3) reaches the receiving cavity (R) provided with a diode, with
10 a low frequency signal proportional to the emission distance, because a modulating wave is associated to a carrying wave so that from said diode the signal passes to the only amplifier (25) or to a plurality of amplifiers and from these to the band filter (26) for the elimination of the
15 ambient disturbances, from which only the modulating wave gets out at three adjustable levels, with variable resistances set for the three distances, and reaches the three alarms (14, 15, 16) that mark the 100, 50 and 25 meters.
- 20 9. A device according to claims 1 and 2, characterized in that said divergent lens (5) is replaced by a small hole and in that in said screen (6) specular blades (28) are provided for determining a greater selection of the beams coming from said lights (1, 2, 3).
25
10. A device according to claim 1, characterized in that when said lights (1, 2, 3) are not working, a light placed in the front part of the vehicle emits electromagnetic waves

with a wave length from 100 to 7000 micron so that said screen (6) together with the monitor receive the waves reflected by eventual vehicles or obstacles thus realizing an absolute independence for each single vehicle.

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FIG.1

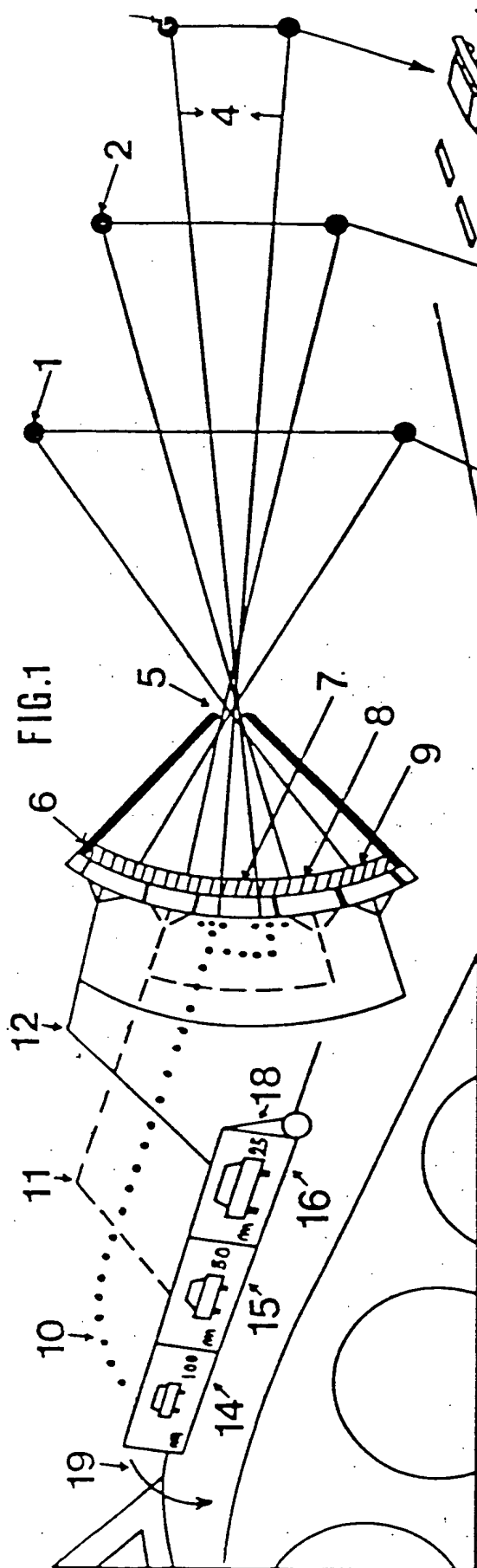


FIG.2

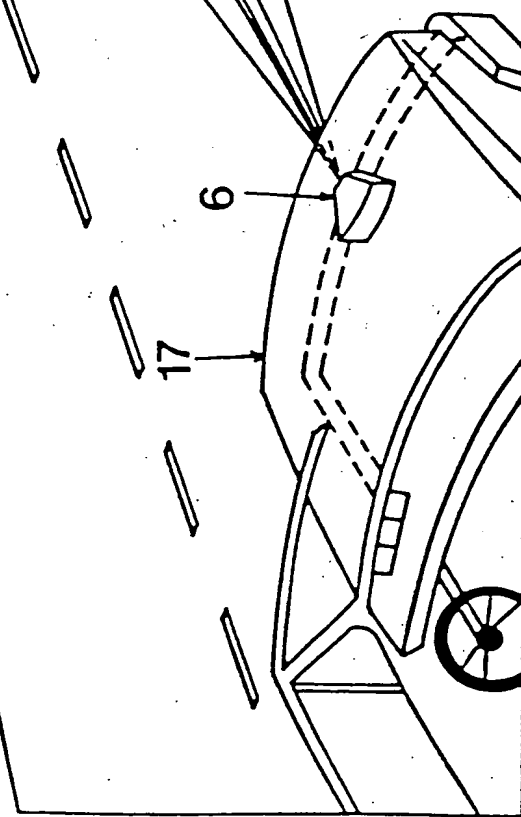
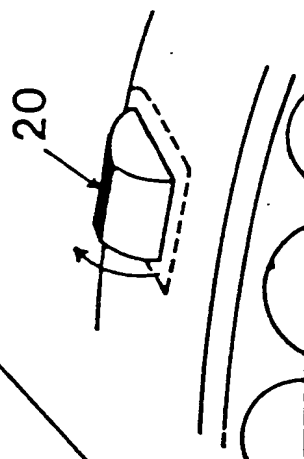
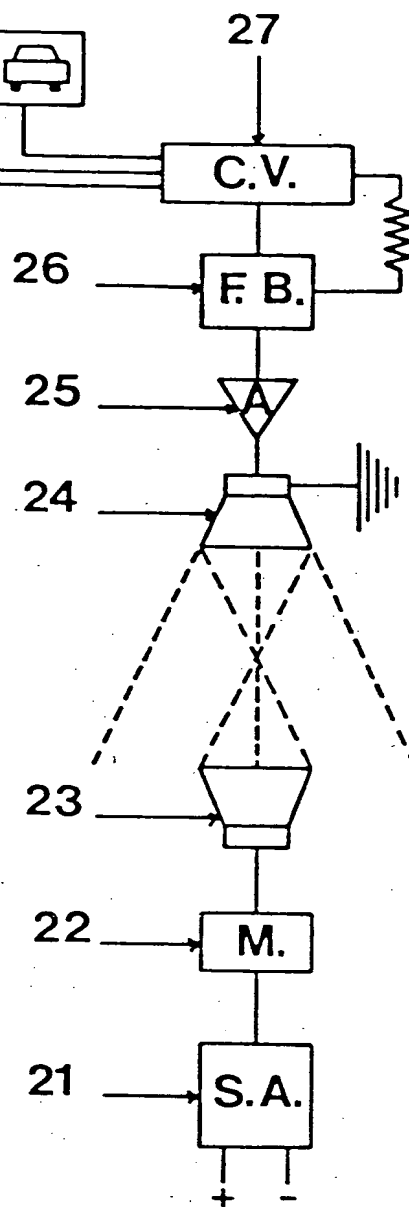
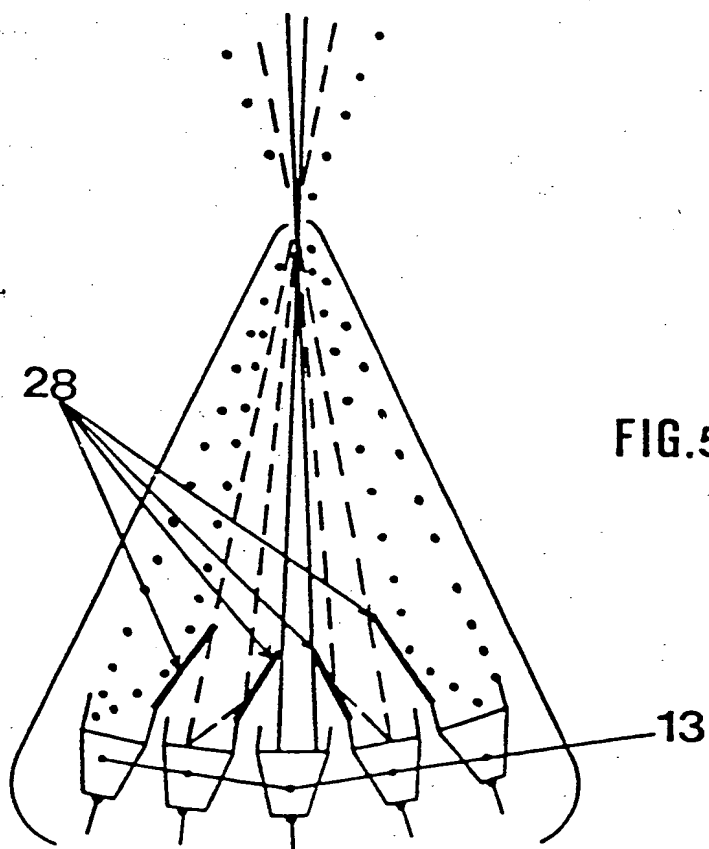
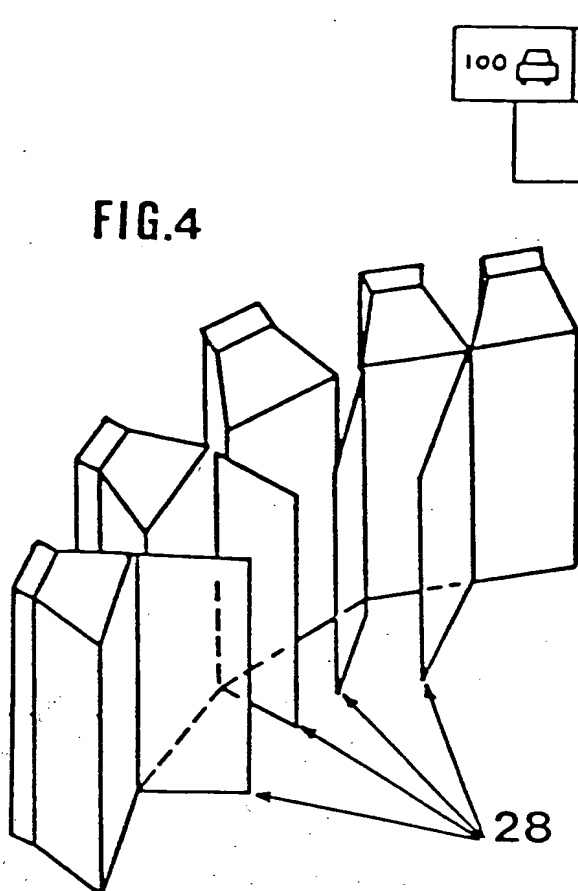


FIG.3




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INTERNATIONAL SEARCH REPORT

International Application No PCT/IT 88/00031

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) *		
According to International Patent Classification (IPC) or to both National Classification and IPC		
IPC ⁴ : G 08 G 1/16; B 60 Q 1/52; G 01 S 11/00		
II. FIELDS SEARCHED		
Minimum Documentation Searched ⁷		
Classification System	Classification Symbols	
IPC ⁴	G 08 G; B 60 Q; G 01 S	
Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched ⁸		
III. DOCUMENTS CONSIDERED TO BE RELEVANT *		
Category ⁹	Citation of Document, ¹¹ with indication, where appropriate, of the relevant passages ¹²	Relevant to Claim No. ¹³
A	FR, A, 1494110 (COMPAGNIE GENERALE D'AUTOMATISME) 8 September 1967 see page 1, left-hand column, lines 22-33 and right-hand column, line 33 - page 3, left-hand column, line 54; figures 1-7	1-5
A	Patent Abstracts of Japan, volume 8, no. 133 (P-281)(1570), 20 June 1984, & JP, A, 5935163 (MITSUBISHI DENKI K.K.) 25 February 1984	1,6
A	US, A, 3011580 (REID) 5 December 1961 see the whole document	1-5,10
A	FR, A, 2576126 (REINAUD ET CHAMBARET) 18 July 1986 see claim 5	1,10
A	FR, A, 2159360 (DAIMLER-BENZ AG) 22 June 1973 see claims	1,4-8
<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p>* Special categories of cited documents: ¹⁰</p> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p> </div> <div style="width: 45%;"> <p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step</p> <p>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.</p> <p>"A" document member of the same patent family</p> </div> </div>		
IV. CERTIFICATION		
Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report	
3rd January 1989	20. 01. 89	
International Searching Authority	Signature of Authorized Officer	
EUROPEAN PATENT OFFICE	 P.C.G. VAN DER PUTTEN	

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ANNEX TO THE INTERNATIONAL SEARCH REPORT
ON INTERNATIONAL PATENT APPLICATION NO.

IT 8800031

SA 23872

This annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report. The members are as contained in the European Patent Office EDP file on 11/01/89. The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
FR-A- 1494110		None	
US-A- 3011580		None	
FR-A- 2576126	18-07-86	None	
FR-A- 2159360	22-06-73	DE-A, B 2156001	17-05-73
		GB-A- 1394222	14-05-75
		US-A- 3892483	01-07-75
DE-B- 1297516		None	

III. DOCUMENTS CONSIDERED TO BE RELEVANT (CONTINUED FROM THE SECOND SHEET)

Category *	Citation of Document, with indication, where appropriate, of the relevant passages	Relevant to Claim No
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A	DE, B, 1297516 (WESCH) 12 June 1969 see claims	1-8
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